PURCHASE DESCRIPTION
Signal Generator, 9 kHz to 1.2 GHz

The General Services Administration has authorized the use of this Purchase Description.

1. SCOPE. This Purchase Description (PD), describes a programmable signal generator. This PD is meant as a minimum requirement for the signal generator in which only those manufacturers that meet or surpass the following requirements are qualified per this PD. This programmable signal generator shall have a frequency range of 9 kHz to 1.2 GHz.

2. SALIENT CHARACTERISTICS. The equipment shall be capable of operation and be bid sample tested within the accuracies, limits, and specifications herein.

2 1. Equipment covered by this PD shall be commercially available equipment and may be modified to the extent necessary to meet the following description. The equipment shall be Class 4, in accordance with MIL-PRF-28800.

2.2. Safety and Environmental. The equipment shall meet all safety and environmental requirements.

2.3. Electrical Power Sources. The equipment shall operate from nominal commercial, military, and shipboard power sources of 110/220 volts AC (±10%) at line frequencies of 50 Hz to 440 Hz. Power consumption shall not exceed 500 VA.

2.4. Temperature Requirements.

2.4.1. Operating Temperature. The equipment shall meet its performance and accuracy requirements in an operating environment of +10°C to +50°C.

2.4.2. Nonoperating Temperature. The equipment shall meet its performance and accuracy requirements in an nonoperating environment of -10°C to +60°C.

2.5 Mean Time Between Failures (MTBF). The equipment Mean Time Between failures (MTBF) shall be at least 4,000 hours.

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2.6. Calibration and Maintenance Adjustments. The design of the system shall provide for readily accessible calibration adjustments and maintenance adjustments. These adjustments shall be provided by variable value components which are adjustable by the use of simple means. The calibration by substitution of selected components or parts is unacceptable unless specifically approved. The calibration adjustments, wherever possible, shall be accessible without removal of the instrument case or modules. The calibration interval shall be a period of one year or greater based on an operating time of 2000 hours.

2.7. Performance Characteristics.

2.7.1 Frequency Range: The signal generator shall have a frequency range of 9 kHz to 1.2 GHz with a resolution of 1 Hz.

2.7.2 Frequency Stability: The signal generator shall have frequency stability of 5×10^{-10}/day.

2.7.3. Spectral Purity:

2.7.3.1 Single Side Band (SSB) phase noise: The signal generator shall have a SSB phase noise of -121dBc/Hz at 20kHz and offset from a carrier frequency of 1 GHz..

2.7.3.2 Non Harmonics Spurious: The signal generator shall have a non-harmonics spurious of -70 dBc for center frequencies of up to 1.2 GHz, and –60dBc for frequencies > 1.2GHz with 10 KHz offset.

2.7.3.3 Harmonics: The signal generator shall have a harmonic of -30 dBc when the output is less than +7 dBm, -25dBc up to +13 dBm.

2.7.3.4 Subharmonic: The signal generator shall have a subharmonic of -70 dBc for frequency range of 640 MHz to 1.28 GHz.

2.7.4 RF Output Level: The signal generator shall have an ouput of +13 to -140 dBm, a resolution of 0.1 dB, absolute accuracy of ±1 dB at +16dBm to –119dBm and ± 3dBm at –120 dBm and below, and a reverse power protection of 50 W.

2.7.4.1 Attenuator Hold: Selection of Attenuator hold provides for uncalibrated level reduction of at least 10dB without he Mechanical Attenuator operating.

2.7.4.2 VSWR: For output levels less than –5dBm, output VSWR is less than 1.3:1 for carrier frequencies up to 1.2 GHz.

2.7.5 Modulation Modes: Internal and external modulation can be simultaneously enabled to allow combined amplitude and frequency (or phase) modulation. Pulse modulation can be used with the other forms of modulation from an external pulse source.

2.7.5.1 Amplitude Modulation (AM): The AM mode of the signal generator shall have a depth of 0 to 99.9% at a resolution of 0.1%. Accuracy of $\pm$ 5% of a set depth at 1kHz. Distortion of < 2.5% at 1kHz rate for modulation depths up to 80% and < 1.5% rate for modulation depths up to 30%.

2.7.5.2 Frequency Modulation (FM): The FM mode of the signal generator shall a maximum peak deviation of 200 kHz for frequency of up to 37.5 MHz, 400 kHz for frequencies up to 75 MHz; a resolution of 1 Hz based on deviation and frequency, a bandwidth of dc to 275 kHz; and a distortion of < 1% at 1 kHz for deviations up to 20% of max available deviation.

2.7.5.3 Pulse Modulator: The Pulse Modulator mode of the signal generator shall have an ON/OFF ratio of >45 dB for frequency range below 1.2 GHz; a rise and fall time of less than 10 μs; a frequency range of 32 MHz to 2.51 GHz.

2.7.5.4 Phase Modulation: The Phase Modulation mode shall have a deviation of 0 to 10 radians with 0.01 resolution; accuracy of $\pm$ 4% of indicated deviation excluding residual phase modulation; 3 dB bandwidth , 100 Hz to 10 kHz; distortion less than 3% at 10 radians at 1 kHz modulation rate.

2.7.5.5 FSK: FSK mode allows for frequency shift settable up to $\pm$ 100 kHz; 2 level or 4 level FSK; timming jitter of $\pm$ 3.2 μs; filter, 8th order Bessel, -3 dB at 3.9 kHz.

2. 7.8 Internal Modulation Source: The signal generator shall have an internal modulation source for the following waveforms: sinusoidal, square, and triangular. The source shall be capable of generating a single or a simultaneous two tone modulation.

2.7.9 Sweep Mode: Sweep modes shall offer linear and logarithmic sweeps. The user shall be able to program all sweep parameters. Linear Sweep frequency step size of 1 Hz minimum; logarithmic sweep percentage increment of 0.01% to 50% in 0.01% steps; step time, 50 ms to 10 s per step.

2.7.10 Interface: The signal generator shall provide a RS-232 interface function and connector with GPIB control.

2.7.11 Instrument Storage: The instrument shall provide features to allow for at least 100 carrier frequency values and at least 100 complete instrument settings to non-volatile storage.

3. REGULATORY REQUIREMENTS

3.1 Regulatory Requirements.The offeror/contractor is encouraged to use recovered materials to the maximum extend practicable, in accordance with paragraph 23.403 of the Federal Acquisition Requlation (FAR).

4. QUALITY ASSURANCE PROVISIONS

4.1 <u>Product Conformance</u>. The products provided shall meet the salient characteristics of this Purchase Description, conform to the producer's own drawings, specifications, standards and quality assurance practices, and be the same product offered for sale in the commercial market. The government reserves the rights to require proof of such conformance.

4.2 <u>Metric Products</u>. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the specified tolerances using conversion tables contained in the latest revision of Federal Standard No. 376, and all other requirements of this Purchase Description are met. If a product is manufactured to metric dimensions exceed the tolerances specified in the inch/pound units, a request should be made to the contracting officer to determine if the product is acceptable. The contracting officer has the option of accepting or rejecting the product.

5. PACKAGING.

5.1 <u>Preservation, Packaging, and Marking</u>. Preservation, packaging, packing, labeling, and marking shall be as specified in the contract or order.